February 2011

Energy Services BULLETIN

Western's monthly energy efficiency and renewable energy newsletter dedicated to customer activities and sharing information on energy services.

CIPCO supports economic, energy diversity

Elk Wind Farm has more to offer Iowa than 41 Megawatts (MW) of renewable power, and those fringe benefits mean a lot to Central Iowa Power Cooperative (CIPCO) and its 13 member distribution co-ops and associations.

An artist rendering shows the Elk Wind Farm turbines spread across farms covering more than 3,000 acres in east central Iowa. (Artwork by Central Iowa Power Cooperative)

Local jobs, revenue, power

When it begins operation next October, CIPCO will be taking the project's entire output for the next 20 years. That power purchase agreement raises the amount of emissions-free resources in the generation and transmission co-op's power portfolio to more than 40 percent. In a press release, CIPCO Executive Vice President Dennis Murdock stated, "Elk Wind is another way we are adding value for CIPCO's member-owners by supplying a clean, renewable source of Iowa-based electricity."

That value includes a boost to the economy of Delaware County in CIPCO's member systems' service territory. The project, which broke ground in December, will mean 100 temporary construction jobs, as well as two permanent operations and maintenance positions in the area. Scattered across 3,200 acres of open farmland, the wind facility will also generate tax revenue and land use payments to farmers who are allowing the 17 turbines to be sited on their property.

Another attractive aspect of the Elk Wind Farm project is that a local developer, RPM Access, is building and operating it. "We are very proud of the fact that most of our power is generated in Iowa—more than 95 percent of CIPCO's electricity comes from resources in Iowa," said Kathe Breheny, CIPCO director of Corporate Communications.

Committed to growth

Supporting businesses in the communities they serve is a cooperative tradition, noted Breheny, and one that CIPCO takes seriously. Visitors to CIPCO's website find evidence of that commitment in its extensive economic development resources.

Prospective power customers served by CIPCO members can find assistance with property location, financing and incentive pricing. The co-op has partnered with private investment companies, a state economic development group, the University of Iowa and its own members to create affordable office space for emerging technology companies.

The economic development activity created by the co-op's revolving loan funds is even more varied. CIPCO started the funds with the help of two U.S. Department of Agriculture programs, the Intermediary Relending Program (IRP) and the Rural Economic Development Loan and Grant (REDLG) program. The programs support job creation and retention, local economic diversification, workforce development and

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What's inside

Webinar offers updates on TIP, new feasibility study

Transmission—the connection of generation to load center—also connects the interests of utilities, municipalities, government agencies, renewable energy developers and investors. These interconnected, and sometimes competing, stakeholders came together last year explore cooperative opportunities for building renewable transmission in the Southwestern United States. The resulting Sonoran-Mojave Renewable Transmission Project (SMRT) Preliminary Feasibility Study is the subject of a one-hour webinar Western is co-sponsoring with the Solar Electric Power Association (SEPA) on Feb. 24, 11 a.m. PST.

The one-hour webinar will first focus on the activities of Western's Transmission Infrastructure Program (TIP). Attendees will also learn about other transmission project news and about the collaborative process that produced the SMRT study.

Recovery Act goals

The American Recovery and Reinvestment Act established TIP to give Western new authority and funding to build transmission lines to help deliver renewable resources to market. TIP goals include:

- Select, study and/or develop projects in the public interest and with public input
- Construct and upgrade transmission resources
- Ensure projects do not adversely impact system operations and reliability
- Ensure economic feasibility of projects
- Partner with others to leverage borrowing authority

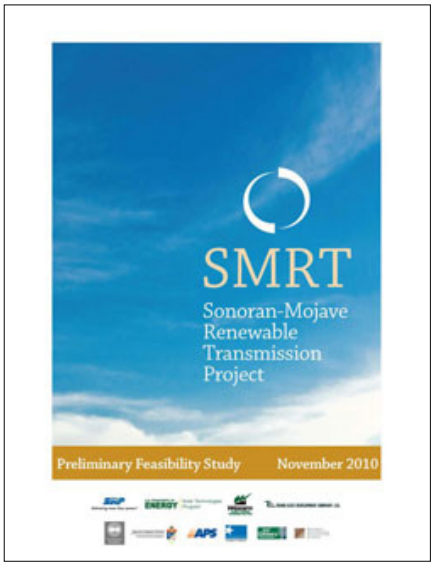
The SMRT study work could help those goals by looking at several potential new transmission lines and upgrades to existing lines that would, if built, support additional renewable resources in the Southwest.

Common interests

The participants funded the study after submitting statements of interest (SOIs)—proposals for potential transmission projects to TIP. "The SOIs showed widespread interest in new and improved transmission lines to bring renewable energy in the Southwest to the markets of California and Arizona," said Western Senior Planning Advisor Theresa Williams.

Western and utilities that joined the study have requests in their respective interconnection queues from renewable resource developers. However, the power grid in the Sonoran-Mojave areas needs new transmission lines and upgrades to the existing system to accommodate additional generation.

Of course, each participant has different ideas about how and where that should happen. Nine public and private power entities conducted the SMRT project study to explore how their goals overlapped and whether certain projects might benefit from a regional effort.



Nine participants, including Western and three firm electric service power customers collaborated on the Sonoran-Mojave Renewable Transmission Project (SMRT) Preliminary Feasibility Study, published in November 2010.

Diverse stakeholders

Williams noted that it is unusual for so many disparate companies to voluntarily partner on a public study. "That's a good indication of diverse interest in seeing new transmission built to support renewables," she said.

Participants included:

- Arizona Public Service Company
- Citizens Energy Corporation
- Department of Energy – Western Area Power Administration
- Department of Energy Solar Technologies Program
- Imperial Irrigation District (IID)
- Salt River Project Agricultural and Improvement District (SRP)
- Starwood Energy Group
- Trans-Elect Development Company and Energy Investors Funds
- 21st Century Transmission an Energy Capital Partners affiliate
- Wellton-Mohawk Irrigation and Drainage District (WMIDD)

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Energy Services Bulletin

The Energy Services Bulletin is published by Western Area Power Administration for its power customers. The mailing address is Western Area Power Administration, P.O.Box 281213, Lakewood, CO 80228-8213; telephone (720) 962-7508.

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Webinar *from page 2*

IID, SRP and WMIDD, customers of Western's Parker Davis Project, all operate their own transmission systems. "They brought the perspective of the individual utility to the table, along with contributing a great deal of transmission data and system engineering work," said Williams.

While all participants contributed equally to the study funding—another unique aspect of the collaboration—each represented different business and technical strengths and points of view. "During the webinar, we will share the lessons we learned about finding common ground in a large, diverse group," Williams said.

Examining projects

The study group set out to examine how building new and upgraded transmission lines to interconnect load centers with new renewable generation might impact the grid. To accomplish this, the group selected five lines, or elements, to evaluate:

- Element A: Hassayampa—N.Gila #2 500-kV Line
- Element B: Palo Verde—Blythe Area (Arizona portion of the Palo Verde—Devers #2 500-kV Line)
- Element C: Rebuild/Upgrade of the Western Colorado River Transmission System (Mead—N.Gila)
- Element D: Imperial Valley Renewable Transmission Project (N.Gila—Devers/Imperial Valley)
- Element S: Las Vegas to Los Angeles Double Circuit 500-kV

The Arizona utilities had studied some of the elements independently, and all of the potential projects would require the cooperation of several entities to build. The study concluded that it was technically feasible for SMRT to develop about 9,500 to 12,500 megawatts of transmission capacity.

What's next

Ultimately, Williams said, Western believes that SMRT participants and regional interests will use the study to help identify the next steps moving forward. "While study participants have spent a lot of time envisioning a business model to make the new and upgraded transmission projects economical, there is much work to do" she explained.

The next steps will be to investigate the viability of specific project configurations—figuring out if there is a market for the power and identifying developers and partnership opportunities. The webinar will cover those topics, and provide information on current and upcoming TIP projects.

Distribution and transmission engineers, system planners, grid operators, supply and procurement staff, renewable program managers and strategic planners should plan to attend the webinar. Attendees are welcomed to email questions about TIP or the SMRT project study to Williams by Feb. 14.

The webinar is free to current SEPA members, and to the media (subject to verification). The fee for non-members is $125. Online registration is available through SEPA.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2011/feb/feb112.htm

CIPCO *from page 1*

improving public infrastructure in rural communities.

CIPCO's board of directors administers the loan programs which provide funding to private businesses, local governments and community development groups. Eligible projects include buying land, machinery, equipment or fixed assets, or building or improving a facility or infrastructure. Recipients range from municipal recreation districts to property developers to an e-waste business. Going back to its first REDLG pass-through loan in 1997, CIPCO has made 21 loans, totaling more than $4,400,000 and, in the process, created or retained 358 jobs.

Good for utilities

While contributing only modestly to the total number of jobs in CIPCO's territory, Elk Wind Farm will add significantly to the co-op's clean energy holding. Diversity strengthens a power supply, providing one of the necessities for a healthy economy—safe, affordable, reliable electricity. "That's how cooperatives grow their business," explained Breheny, "That's why Central Iowa Power Cooperative will continue to invest in our region's economy and in renewable resources."

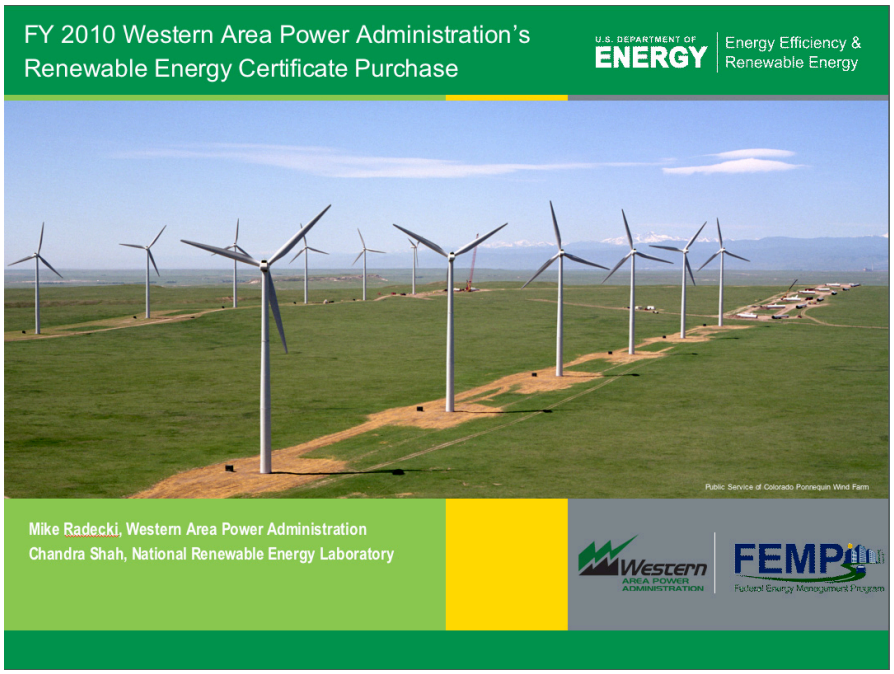
Want to know more?
Visit www.wapa.gov/es/pubs/esb/2011/feb/feb111.htm

Western customers invited to join REC purchase

It's that time again when Federal agencies and other Western customers have the chance to go green the easy way—by joining in Western's annual aggregate purchase of renewable energy certificates (RECs).

Each year, in support of the Federal Energy Management Program, Western invites Federal agencies and its customers to join in purchasing the environmental benefits of renewable energy. Interested parties submit a statement of intent so we can issue a request for proposals from renewable energy developers and REC marketers. Participants get the advantage of Western's expertise and buying power to procure the product that meets their needs at a price they can afford.

This service has been available to our Federal customers since 2005 to help them meet mandated renewable energy goals. Our customers can also use RECs to comply with the requirements of Western's Energy Planning and Management Program. "Because states, municipalities and utility boards are increasingly setting their own energy goals, we've extended the program to non-Federal customers, too," said Mike Radecki, Energy Services representative for Western's Upper Great Plains Region.



How solicitation works

The process is relatively straightforward, Radecki added. "Interested customers can download the Statement of Intent for Federal Agencies to Purchase Renewable Resources (SOI) from the Renewable Resources for Federal Agencies website, fill it out and e-mail or fax the completed form to me at 406-247-7408," he said. "Non-Federal customers can use the same form, but there is a separate form for Western preference customers."

This year's "call for interest" will begin in February with a news release. A webinar to explain the process will be held March 7, and all requests to participate must be submitted prior to May 31, 2011. Western anticipates releasing an RFP in June with proposals due approximately 30 days later. Westerns goal is to award all REC contracts by Sept. 30, 2011.

Customers use the SOI to state the quantity of RECs they are seeking, the price they hope to pay, and desired contract length. The SOI is where customers can also identify specific characteristics they would like the product to have, such as the type of renewable resource, the in-service date of the generator or the region from which the REC comes, among other criteria. Federal agencies will have to complete an interagency agreement (IA) prior to the contract award.

The requirements from the SOIs (except price considerations) are compiled into a request for proposal (RFP) that Western posts on its website. The Green Power Network also posts the solicitation online as a courtesy to website visitors. Interested vendors can receive the solicitation by direct e-mail by contacting Radecki.

Vendors then submit proposals which Western reviews to determine if they meet the needs of each participant in terms of quantity, price, duration and special considerations. Prospective vendors should be able to show that their past performance on contracts meets Western's standards. Western

See REC PURCHASE page 7

Technology Spotlight:

Consider choosing 'Super Premium' motors

The bar has been raised again for motor efficiency. Several motors are now available that can achieve efficiency levels significantly higher than the "Premium Efficiency" standard recently mandated for general purpose motors imported or sold in the United States (effective December 2010).

In 2008, the International Electrotechnical Commission designated the even-higher "Super Premium" level for 60 Hz motors. At that time, it was noted that motor manufacturers might have to go beyond alternating current (AC) induction motor technology to achieve the required minimum full-load efficiency values. Yet less than three years later, we're seeing "Super Premium" efficiencies commercially available in newer technologies such as permanent magnet (PM) and switched reluctance (SR) motors.

Permanent magnet motors

Long used in servo motor applications, PM synchronous motors are increasingly being used in industrial motor drive systems. PM motors use powerful ceramic or rare earth neodymium iron boron (NdFeB) magnets attached to the surface of the rotor or interior to the rotor in order to establish a permanent magnetic field. This design replaces the traditional aluminum rotor cage of the induction motor and significantly reduces the secondary circuit rotor I2R losses. The PM motor is designed for variable-speed operation and must be controlled by an inverter that is specifically developed to properly start and synchronize PM motors. The motors have an inherently high power factor and have demonstrated to exceed the "Super Premium" efficiency levels even when controller losses are included.

Rotor of a permanent magnet motor with CFRP sleeve. (Photo by Permanent Magnet Motors)

While rotor magnets add cost to PM motors, their light weight means that they have greatly reduced steel and copper costs relative to a "Premium Efficiency" motor. Some manufacturers have now established rating-equivalent pricing strategies that make PM motors cost-effective when compared to conventional "Premium Efficiency" motor/adjustable speed drive (ASD) technology.

Due to their light weight, high torque and low inertia, PM motors are often specified for electric vehicle hub motor drives and for regenerative elevator drives. Industrial applications for which PM motors are suitable include adjustable speed pumps, fans and compressors, plus extruders, conveyors, crane and hoist systems, pumps, winders and printing presses.

Switched reluctance motors

Like the PM motor, a switched reluctance (SR) drive system requires both a motor and an electronic power converter or controller that controls both torque and speed. The controller eliminates low speed cogging (jerky motion) by switching motor phases on and off in relation to the rotor position. The motor cannot be used without the converter and cannot be used with a conventional variable frequency drive or inverter. Unlike the PM motor, the "Super Premium" efficiency SR motor has a rotor that does not have magnets, rotor bars or windings. SR motors are simply designed, rugged, and cost less to manufacture than a conventional AC motor – yet can produce up to twice as much power when compared on a size basis.

SR motors are rapidly moving from the servo and hybrid electric vehicle drive arena to industrial applications such as screw compressors, blowers and high speed pumps; and low-speed, high-torque applications such as extruders, conveyors and feeders. SR motors are often used in applications that require a systems solution such air conditioning compressors, weaving looms, laboratory centrifuges and pumps in reverse osmosis systems.

Hybrid – line-start PM motors

The hybrid line-start PM motor (LSPM) has a conventional three-phase distributed winding in the

See TECHNOLOGY SPOTLIGHT, page 8

Website of the month:

Energy Efficient Rehab Advisor

Municipalities, housing agencies and utilities facing the unique challenges of improving energy efficiency in multifamily housing can find help in the Energy Efficient Rehab Advisor.

The Advisor is a web-based tool, funded by the U.S. Department of Housing and Urban Development (HUD), to help the housing community improve energy efficiency in existing buildings during rehabilitation and renovation. Incorporating energy efficiency into a property rehab project is a significant step toward making America's housing stock energy efficient, durable, sustainable and healthy.

The home page gets users right down to business with a brief introduction, along with an explanation of the purpose of the website. Below the introduction is row of icons explaining the benefits of energy-efficiency improvements, including comfort, durability, ease of maintenance and more. Selecting an icon opens up a small window with a short paragraph, rather than a full webpage.

Interactive profile builder

At the bottom of the home page is an interactive tool that allows users to customize their search for information. Users select the type of building they plan to renovate, their role in the project, the local climate and the age of the building. The role of the utility is probably best represented by "technical advisor," although utility representatives will most likely use the profile tool to advise customers in other roles.

From those inputs, the tool produces a profile page that explains how energy-efficiency improvements will specifically benefit the user. On the left side of the profile page is a list of project categories, such as kitchen, bathroom, roof and heating and air conditioning. These links take the user to a page that covers specific measures and the incremental cost, savings and payback produced by choosing the more efficient measure over the minimum required by the local code or standard. For example, the owner of a multifamily building may choose to seal leaks around windows, doors, floor, ceiling, plumbing and electrical features in his property. The profile shows that the added cost to the owner will be $.29 per sq. ft., and save $.22 per sq. ft. for a payback period of 1.3 years. Beside economic information is the benefit icon from the front page, indicating how the measure will improve the building.

The profiling tool draws on computer models of typical single family and typical multifamily buildings in the climate zone. The energy-efficiency recommendations are based on ENERGY STAR specifications. The Rehab Advisor also references two HUD publications, Guidebook for Optimizing Utility Consumption in Existing One-to-Four Family Dwellings and Guidebook for Optimizing Utility Consumption in Existing Multifamily Dwellings.

Great resources, but…

In addition to the profile tool, the Rehab Advisor provides web links on specific topics, installation instructions, resource guides and more. This page is not clearly identified or linked from the home page, where users will have to select the embedded link "general information" in the introduction text to get to it. On the profile pages, "web links" is the final button in the left-side navigation bar.

Adding to the confusion, the description "web links" doesn't really do justice to the comprehensive resource library Rehab Advisor has compiled in this section—it is well worth the effort to find the page. It offers in-depth explanations on subjects ranging from solar hot water heaters to historic building renovation to radon mitigation. On the right side of the web links page is a navigation bar listing more general topics, such as building codes, energy, financing and Federal programs.

See WEBSITE OF THE MONTH page 7

Website of the month *from page 6*

Every topic page provides information from Rehab Advisor as well as links to external resources. Some of those links are embedded in the text, while others are located in the right-side navigation.

While its information resources may not be as well organized as they could be, Rehab Advisor is a valuable website, nevertheless. Individuals involved in building and property management—especially those who are new to remodeling and renovation—and the utilities that serve those customers, should bookmark this resource.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2011/feb/feb115.htm

REC purchase *from page 4*

will then prepare contracts between Western and the supplier that meets the participants' specifications.

What RECs can, can't do

First created in 2000, RECs split the power from a renewable energy plant into two distinct products:

- Generic electricity sold into the local grid
- Environmental attributes of electricity from renewable resources

By selling the products separately, facility owners are able to recoup the additional costs associated with emerging technologies. Distributors and end-users can support green energy development even though they may not be physically located near the facility. RECs eliminate concerns about securing transmission or interfering with existing power purchase agreements.

"Because of the convenience associated with RECs, the product has played a significant role in helping Federal agencies support the growth of renewable energy markets," said Radecki. "Agencies can buy them for multiple sites or leased sites. And Western requires that the RECs we procure through our solicitation are certified and verified green."

Even with all their advantages, however, RECs are not necessarily for everyone. Since their purchase does not affect the customer's utility bill, RECs offer no hedge against fuel price volatility—one of the benefits of green power delivered directly. Also, there is no guarantee that the energy from the facility that generated the REC will be integrated into the customer's local power system. RECs may not meet the requirements of participants whose goals or mandates focus on developing local renewable energy supplies.

Learn more

Contact Mike Radecki to register for the free webinar March 7 that will walk interested customers through the solicitation process. You may also download the presentation from the 2010 webinar, or direct questions to your Energy Services representative.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2011/feb/feb113.htm

Technology Spotlight

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stator (identical with conventional induction motors), a rotor with an aluminum cage and internal permanent magnets, but it starts and accelerates directly connected to the line and without the need for a controller.

LSPM motors provide high torque, operate at a fixed synchronous speed regardless of load and are suitable for driving low inertia loads.

Applications overview

PM and SR motor drive systems should be considered for industrial applications in which:

- The application requires speed control
- Driven equipment is in operation for more than 2,000 hours per year
- An old standard efficiency motor is driving a centrifugal load (pump or fan) with throttled or damper flow control
- Operations involve frequent starts and stops
- Small motors operate at partial load a good deal of the time
- The PM or SR motor can be used in a direct drive configuration to displace a two-speed motor with gearbox, a gear motor, or a belted power transmission system
- Resonance frequencies must be avoided in vertical pump-mount applications

Comparing your options

To choose the "best available" motor for a given application, motor purchasers must be fully aware of motor costs and system performance characteristics. The fact sheet Super Premium Efficiency Motors are Now Available (262 kb pdf) includes a chart comparing typical operating characteristics of available variable-speed drive motors and controllers.

For further information, call Western's Energy Experts hotline at 1-800-769-3756 or email your question.

Want to know more?
Visit www.wapa.gov/es/pubs/esb/2011/feb/feb114.htm

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